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MINNESOTA DEPARTMENT OF LABOR & INDUSTRY

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Wiring Methods for Class 2 LED Drivers

Are LED Driver output circuits Class 1 or Class 2 systems?

Answer: Lighting systems operating at 30-volts or less shall be listed as a complete system per NEC section 411.3, however individual LED drivers that are identified as recognized components by a Nationally Recognized Testing Laboratory (NRTL) are also permitted with certain conditions.

The drivers used in a typical LED lighting system in residential and commercial applications are listed as Class 2 or are individually identified as recognized components to be used as part a field-installed lighting system.

Class 2 LED drivers that are part of a listed system comply with UL 1310 *Standard for Safety for Class 2 Power Units* which requires the output voltage to pose no risk of fire or electric shock so secondary circuit protection is not required.

The UL standard restricts the driver output to less than 60 volts in dry applications and less than 30 volts in wet applications. To be listed, the secondary current cannot exceed 5 amps and the total power output rating must be less than 100 watts.

The standard also requires Class 2 LED driver is clearly identified as a **Class 2 Power Supply**.

Although they are low-voltage, LED drivers that are not marked as Class 2 have a voltage output above the limits of UL1310 and are considered Class 1. The power output of the secondary of an LED driver with a Class 1 rating is over the maximum 100 watts.

Note that the terms “low voltage” or "limited energy” may be used by manufacturers but only a listed or recognized component Class 2 power supply qualifies for the less restrictive NEC installation conditions.

Can the control conductors for LED Drivers with 0-10 volt dimming systems be installed in the same raceway as the supply (power) conductors?

Answer: Maybe

Installers can be confused by the permission found in NEC section 300.3(C) allowing conductors to occupy the same enclosure, cable, or raceway when all conductors have an insulation rating equal to at least the maximum circuit voltage applied to any conductor within that enclosure, cable, or raceway.

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This allowance does not apply when the LED driver is identified as a Class 2 device. The Informational Note following section 300.3(C) directs the user to NEC Article 725 Class 1, Class 2, and Class 3 Remote-Control, Signaling, and Power-Limited Circuits.

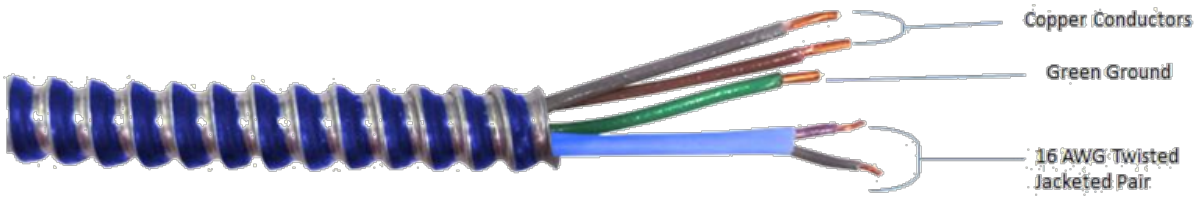
Section 726.136 requires Class 2 conductors be isolated from power conductors.

The possibility that a Class 2 conductor could come in contact with and become energized at a higher voltage is the reason that it not be placed in any cable, cable tray, compartment, enclosure, manhole, outlet box, device box, raceway, or similar fitting with conductors of electric light, power or Class 1 circuits.

How can the new Type MC cables listed for LED power and control wiring comply with the separation requirement?

Answer: As with most hard-and-fast code rules, there are exceptions and allowances. NEC Section 725.136(I) allows Class 2 conductors to be installed with conductors of electric light, power, and Class 1 circuits when a minimum 2-inches of separation is maintained or if they are separated by a non-conductor in addition to the insulation on the conductors.

In compliance with the rules in 725.136(D)(2) the new Type MC cable has been developed specifically for LED power and control wiring. This section also permits the combining the conductors when the Class 2 control conductors are permanently separated from all of the Class 2 and Class 3 circuit conductors by a continuous and firmly fixed nonconductor, such as porcelain tubes or flexible tubing, in addition to the insulation on the conductors.



In addition to the metal jacket and individual conductor insulation, listed LED MC cable is constructed with an supplementary, fixed, non-conductive cover that electrically separates the Class 2 conductors from the higher voltage conductors. The covering material creates and maintains the code-required barrier allowing the Class 2 and power conductors to be in the same cable assembly without risk of possible contact.

How can the MC cable be used and still maintain the required separation in enclosures?

Answer: NEC 725.136(D) applies to installation of associated systems and allows Class 2 circuit conductors in compartments, enclosures, device boxes, outlet boxes, or similar fittings with the power conductors when they to connect to the associated equipment and are routed so that at least a ¼-inch space is maintained between the Class 2 and power conductors.

When terminating this new Type MC cable the power conductors and the Class 2 conductors enter the enclosure as one cable assembly, but installers must take care not to remove the non-conductive covering. Remembering that the Class 2 and power conductors are generally required to be individually separated, the non-conductive barrier material should remain intact as close as practicable to the terminal.